

Wales, which it has been our duty to publish in *Kemp's Mercantile Gazette* during the past eleven years:—

Year.	1st quarter.	2nd quarter.	3rd quarter.	4th quarter.	Totals.
1867	3,981	4,081	3,555	4,233	15,850
1868	4,091	4,131	4,139	3,501	15,862
1869	3,819	3,997	3,495	5,207	16,518
1870	2,804	1,589	1,773	1,985	8,151
1871	2,142	2,191	1,837	1,994	8,164
1872	2,192	1,980	1,795	2,145	8,112
1873	2,354	2,299	2,054	2,357	9,064
1874	2,193	2,428	2,339	2,290	9,250
1875	2,331	2,277	2,133	2,453	9,194
1876	2,744	2,573	2,670	2,861	10,848
1877	2,829	2,856	2,610	2,952	11,247

Total for 11 years ... 122,260

"The question occurs: Does the number of failures in a year depend upon natural causes? that is to say, Would the number rise and fall periodically according to the state of trade (or national prosperity) if the Bankruptcy Law remained constant? Whenever failures have become frequent, complaints have been made against the Law, and not without reason, but many who complain ignore the existence of any other cause. We compared the foregoing figures with the scientific tables recently published in *NATURE*, from the pen of Prof. Balfour Stewart,¹ and, being struck with the coincidence in their fluctuations, we further compared them with the statistics published by Messrs. Dun and Co., of New York, of the failures in the United States during the past eight years,² which period, being that of the existence of our present Bankruptcy Law, affords us a fair opportunity for making a comparison. Messrs. Dun and Co. report the following as the total failures in the United States during this period:—

1870, Number of Failures,	3,551
1871, " "	2,915
1872, " "	4,069
1873, " "	5,183
1874, " "	5,830
1875, " "	7,740
1876, " "	9,092
1877, " "	8,822

"Evidently the same causes which were at work in England to depress trade and overwhelm the struggling and improvident classes, were equally effective in other countries—similar complaints of depression come to us from every part of the globe.

"The discussion which has arisen out of Dr. Hunter's suggestion of a 'famine period' in India, has brought to the public some knowledge of the existence of natural periods or cycles, of an average duration of 11·9 years each. The suggestion that England is affected with the same regularity is but reasonable, and although fortunately for us as a nation the effects do not produce famine, it appears evident that some degree of suffering is caused, and that the number of failures is thereby materially increased—the commercial panics which have occurred with about the same regularity furnish further evidence that this is the case.

"If we make due allowance for the excessive number in the last quarter of 1869, caused by the change in the Law, we find that the maximum number of failures in the last cycle occurred in the year 1868, which was the year succeeding the natural minimum; hence we may conclude that about a year is required for the full effect of the natural depression to be reproduced in commerce. The twelve months from October 1, 1867, to September 30, 1868, appear to have been more serious to commercial men than either of the complete years, according to the number of failures:—

" In the 4th Quarter of 1867 there were	4,233 failures.
" 1st " 1868	4,091 "
" 2nd " 1868	4,131 "
" 3rd " 1868	4,139 "

Total ... 16,594

"These data indicate that we have not yet reached the worst of the present period—assuming that it runs an average length,

¹ Vide *NATURE*, vol. xvi. pp. 9, 26, 45.

² Messrs. Dun and Co.'s Annual Circular, January, 1878.

we have to endure an increasing number of failures which will not reach its maximum until the fourth quarter of 1879."

JOHN KEMP AND CO.

Since this was written I have had counted the number of failures gazetted since January 1, 1878, and I find that they are 2,042 in excess of the corresponding period (January 1 to November 19) in the preceding year.

J. K.

Strange Properties of Matter

THE following are two experiments which will, perhaps interest some of your readers:—

Experiment No. 1.—The "Welding" of Metals at Low Temperatures

Some time ago, [in order to estimate the amount of hydrocyanic acid in a solution, I precipitated it with silver nitrate. After having filtered and washed the precipitate, I reduced it to the metallic state by heating to the required temperature. Just as I was about to allow it to cool, I noticed a small piece of dirt among the reduced silver. In order to separate them, I took a thin platinum wire, and pushed the silver to one side, but on attempting to take the wire away the silver remained in contact with it. As I thought this curious, I tried the following experiment. I took a piece of silver foil about one centimetre square, placed it in an inverted porcelain crucible lid, and heated it to about 500° C.; then I brought into contact with it the extremity of a thin platinum wire, and to my astonishment the wire raised the silver from the lid, and it remained in contact when cold, as the silver was so very much below its melting-point; the above fact caused me some surprise, and I could not satisfactorily account for it.

I wrote to Sir W. Thomson, F.R.S., giving him a description of the above experiment, and in return I received a reply asking me to come and show him the experiment at his laboratory. I accordingly went up to the Glasgow University, and repeated it before him. He was very much interested, and advised me to write to *NATURE*, giving a description of the experiments. Sir W. Thomson gave the following explanation—That it was a remarkable case of "cohesion," the two metals, in fact, "welding," although the temperature was far below the melting-point of silver. The above experiment can be performed successfully at lower temperatures than 500° C., if smaller pieces of foil are taken. Other metals, for instance, copper and aluminium, cohere to silver in the same manner as platinum, but less strikingly.

Experiment No. 2.—A Curious Resonator

Some months ago I made the following experiment:—I took a small tuning-fork and struck it on the table. After the note had died away, so that it was no longer audible, I held the fork in the tip of the flame of a Bunsen burner, when the note was given out, so that it could be heard at some distance. I showed Sir W. Thomson this experiment, who gave the following explanation—That owing to the difference in density of the gases in the flame, the flame acted as a resonator, and so the note was emitted.

It seems to me that experiment No. 1 could be made the subject of an interesting research, but as I am wholly engaged in commercial pursuits, I am unable to take it up.

CHARLES A. FAWSITT

Glasgow, November 12

Galvanometer for Strong Currents

I MUST confess that I was surprised by Mr. R. E. Baynes' communication, in *NATURE*, vol. xix. p. 33, that the galvanometer I have proposed in *NATURE*, vol. xviii. p. 707, has already been described. Before writing my article I have searched a good many books and journals relating to the subject without finding an allusion to any such instrument. Since Mr. Baynes drew my attention to "The Elements of Physical Manipulation," by Prof. Pickering, of the Massachusetts Institute of Technology, U.S., I have procured this book and find that it certainly does contain the theory of a galvanometer like mine, with the coil moving round a horizontal axis. As far as I know, such an instrument has, however, not been practically employed either in this country or on the Continent before I introduced it, though its want must have been much felt for some time past. This seems to show that Prof. Pickering's description of the instrument has not been brought to the general

knowledge of electricians. If, therefore, my article in NATURE, at a time when electric currents of great strength are being so widely introduced into practical working, has contributed to make electricians acquainted with this form of galvanometer, I shall not regret the time I have spent in theoretically and experimentally investigating this subject. Prof. Pickering alludes in his book to the improper *dip motions* of the needle as a defect in his form of galvanometer; I think I have obviated this by pivoting the axis of the needle at both ends. Since communicating the results obtained with my *experimental* instrument, more elaborate instruments have been constructed and found very useful in many instances where the ordinary forms of galvanometers would not have answered the purpose. EUGEN OBACH

Woolwich, November 19

Utilisation of the African Elephant

I have just read some remarks in NATURE (vol. xix. p. 54) on the utilisation of the African elephant, which I think are worth considering. Judging from the specimens in the Regent's Park Gardens, which I suppose have not been selected in any way, and are therefore only average samples of the African species, I should say that the African elephant would prove harder and capable of more work than the general run of Indian elephants. I was surprised to find that the two African elephants I saw in the Regent's Park were what the mahouts call "Dohara Band," which I would translate "double constitution." I do not think that more than five per cent. of Indian elephants are placed in this class. It is very rare indeed to see an elephant of this class in a Government Feekkanah, or in the hands of any European, because wealthy natives value them so highly and give such enormous prices for them, that even when caught by a Government keddah officer they are often sold on account of the fancy prices they fetch. The "Dohara Band" elephant will do a wonderful amount of work on a small quantity of food, and stands fatigue and exposure to the sun far better than any other sort.

To commence elephant-catching operations in Africa, six "koonkies," *i.e.*, elephants trained for catching purposes, would be required, and about twenty men from Assam or some other jungle district of Bengal would be sufficient. With this establishment it would be possible to catch and train at least two hundred elephants in the course of twelve months.

H. L. JENKINS

Clanacombe, Kingsbridge, South Devon, November 24

OUR ASTRONOMICAL COLUMN

ORBITS OF BINARY STARS.—In a communication to *The Observatory*, Dr. Doberck, of Col. Cooper's Observatory, Markree Castle, has summarised the results of the investigations on the orbits of the revolving double stars which have occupied him between three and four years, and which he has conducted with so much skill and laborious application. In a climate where the skies are too irregularly favourable to allow of an astronomer occupying himself wholly upon observations, it would be difficult to name any more interesting work to which he could devote his leisure, than such a revision of the elements of the binary systems. Dr. Doberck's account of his methods in different cases will be of much service to any one who may engage upon similar researches. He has found no reason to detract from the value of the early, graphical method of Sir John Herschel; on the contrary, instances are mentioned where it has been of the greatest service in tracing out the general form of the orbit, for correction by more refined processes, as in the difficult case of Σ 1768: indeed, Dr. Doberck considers it superior to the second method given by Herschel from its admitting of the weights being approximately taken into account with ease. In a provisional orbit for the close double star Σ 3121, the period assigned is thirty-seven years; at present we know of only two more rapid binaries. Some of the orbits included in Dr. Doberck's paper, have been made the subject of communications to the Royal Irish Academy, and have been published in the *Transactions*.

LALANDE'S STARS, NOS. 5,499 AND 45,400.—Mr. J. E. Gore writes suggesting variation in both these objects.

In examining the question of variability of any of Lalande's stars, Mr. Gore will find it necessary, in the first instance, to have recourse to the original observations as printed in the "Histoire Céleste," there being many errors in the reduced catalogue. Thus, No. 5,499 appears through a misprint at p. 246, where the transit at the third wire is given as 2h. 47m. 45^s.2s., instead of 2h. 42m. 45^s.2s. The star is really No. 788 of Weisse's Bessel. The following star is also thrown out by a similar error in the time of transit, so that Lalande, 5,520, requires a correction of - 5m. in R.A. With regard to No. 45,400, the suspicion of variability is probably occasioned by a misprint in the "Histoire Céleste," since Piazzi, Bessel, and others estimate the magnitude the same as at present.

THE ANNULAR ECLIPSE OF JANUARY 22, 1879.—The first of the annular eclipses of the ensuing year, a return of that of January 10, 1861, which was central in Australia, commences in Uruguay, whence the belt of annular phase traverses the South Atlantic, passing over Tristan d'Acunha, the few inhabitants of which islands may probably be startled by seeing the sun transformed into a narrow luminous ring while he is high in their heavens. The central line crosses the African continent in the direction of Pemba Island, north of Zanzibar, where the annularity will continue nearly three minutes: the middle of the eclipse at 4h. 6m. P.M., local mean time.

GEOGRAPHICAL NOTES

THE Council of the Royal Geographical Society have determined to commence, on January 1, 1879, the monthly issue of a new series of their *Proceedings*, under the title of *The Proceedings of the Royal Geographical Society and Monthly Record of Geography*. The latter part of this title will, we believe, fairly indicate the nature of the contents, which will include the papers read at the evening meetings, original articles, geographical notes, obituary notices, proceedings of geographical societies, and brief analytical notes on new books and maps. Each monthly number will be illustrated with one or more maps, and no doubt in this respect endeavours will be made to meet the wants of a public larger than that contained within the ranks of this popular society, which now numbers some 3,400 members.

In connection with this we regret to announce that this month's number of the *Geographical Magazine* brings the career of that journal to a close. This regret, however, is considerably mitigated by the fact that the new form of the Geographical Society's organ is intended to take the place of the journal which for so many years has been so ably conducted by Mr. C. R. Markham. Mr. Markham deserves great credit for his disinterestedness in continuing to carry on a journal which aimed so successfully to be the organ of scientific geography in this country. The volumes will form a valuable record of the progress of geography for the period over which they extend. In the December number Mr. Markham gives an account of the career of the journal since its first start as *Ocean Highways* in 1870. We trust that the new organ will prove a worthy successor of its predecessor, and that while giving due prominence to geographical news, the conductors will aim at bringing geography under the guidance of sound scientific principles.

THE Church Missionary Society have recently received from Mr. A. M. Mackay, of their Nyanza Expedition, the journal of his experiences, extending from December 31, 1877, to May 16, 1878, in which occur some useful suggestions to African travellers, as well as information of considerable interest to geographers. On April 30 Mr. Mackay reached Uyui, after a hurried and tedious tramp